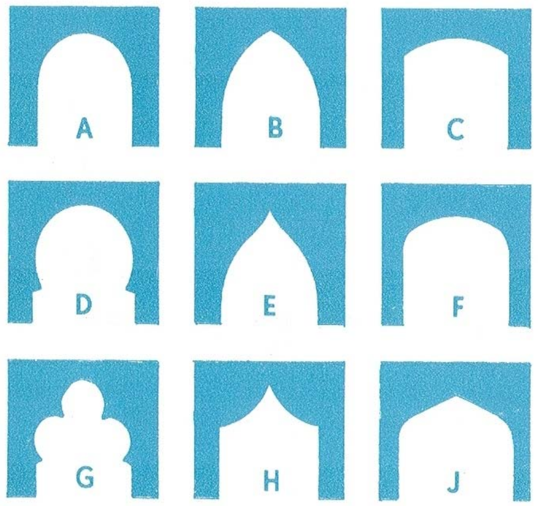
Index to Section D: Precedent Study

1. **A brief overview of arches, vaults and minarets and its application within a local architectural context.** (Please refer to section-A for more details of a breakdown of the classical Islamic elements).
2. **Case Study:** Principles from the Great Mosque at Mecca
3. **Case Study:** Museum of Glass and Ceramics, Tehran, Iran
4. **Case Study:** The Martyr's Memorial: Amman, Jordan
5. **Case Study:** Museums, Galleries and Churches by Tadao Ando
6. **Case Study:** Aga Khan Awards

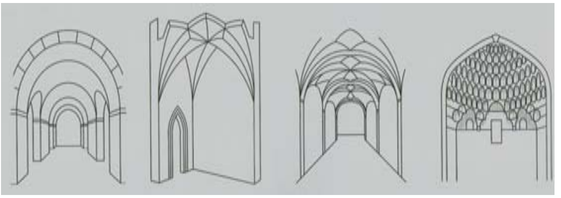
1. A brief overview of arches, vaults and minarets and its application within a local architectural context:



- Arches were essentially constructed due to their structural suitability in a time when construction techniques were limited: arches were primarily used to create openings in load-bearing walls, and were simultaneously aesthetically pleasing. They soon developed into various forms and types over the passage of time and over the dynasties of varying regions. (Hattstein: 2001).

Thus, arches, and even vaulting such as barrel, cross and fan vaults, were merely techniques to brace the structural limitations of their time. With the advent of concrete, these archetypes, within the political Islamic world, were replaced by the column and beam method of construction: the way forward was seen to be set by the trends of European models.
(Hattstein: 2001).

Fig. 1. Arches (From Pothorn: 1971, p.146).
Fig. 2. Vaults (From Hattstein: 2001, p.).



Nasr, in his book on Islamic patterns, mentions that the essence of the arch could be said to be its rhythm and repetitive nature, which is emphasized within a colonnade. He further postulates that it is the rhythm and repetition and not the physical elements themselves which has become attached to Islam. (Nasr: 1990).
However, within a local context, arches are still used: a simple illustration would be the recent Dar-as-Salaam centre in Laudium, wherein arches were used to portray an Islamic eminence, as depicted below:






(Fig.'s 3-6. Local studies). Dar-as-Salaam, Laudium, 2000 – uses arches to create an Islamic eminence

However some institutions, such as the Brits Friday Mosque, have turned away from the typical usage of arches, and rather maintain the element of rhythm and repetition as the remains of a classical element.






(Fig.'s 7-10. Local studies). Friday Mosque, Brits, 1998 – uses repetition in material, colour and architectural elements to create the rhythm in the absence of the arched colonnades.

Where arches have been used, they have been portrayed in a modified manner, depicting a link with the past heritage, and yet indicating the way forward as illustrated below:



Rusty red aluminium arch attached to wall with linear elements



Arched skylights placed above linear main entrance



Arched semi-permeable roof attached to linear columns



Pointed arched window within linear setting

(Fig.'s 11-14. Local studies). Friday Mosque, Brits, 1998 – uses arches in an innovative manner, to create a theme of the past within a new context.

The play with arches in a new manner within a linear setting using columns and beams seems to work effectively, and portrays a traditional link, yet plunges towards a new Islamic spirit.

'Wall-architecture' is a theme which comes across strongly, even though the column and beam method have been adopted in both the Brits and Laudium Mosques. Historically, walls with heavy massing, characterized by small windows, due to structural limitations, were typical. With the advent of curtain walls, the Islamic world experienced larger openings, but essentially maintained large spans of external walling. In this manner, the internal world is celebrated. From the perspective of local climatic conditions, this type of massing, coupled with recessed windows, creates optimal internal thermal environments for both winter and summer months. Illustrated below are examples:







(Fig.'s 15-17. Local studies). Friday Mosque, Brits, 1988 – carries forth the theme of 'wall-architecture', with a bland external wall, decorated by functional requirements stemming from the inter sphere of the Mosque.







(Fig.'s 18-20). Dar-as-Salaam, Laudium, 2002 – celebrates a 'wall-architecture' decorated by a face-brick façade, with recessed windows informed by the internal requirements of the Mosque.

Minarets, as discussed in Section-A, have been through changes with the advent of time, as depicted below:

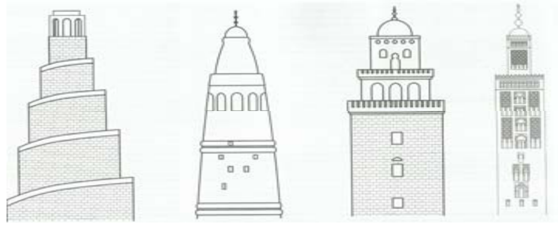




Fig. 21
Minarets through history.
(From Pothorn: 1971)

From a more local perspective, minarets haven't assumed much transformation, and are an assimilation of past minarets. Depicted below are some examples of local minarets:
(Fig.'s 22-26. Minaret study).



Dar-as-Salaam, Laudium, perspective



Dar-as-Salaam, Laudium



Friday Mosque, Zakaria-park



Saint-Gothard, Friday Mosque, Johannesburg



Friday Mosque, Laudium

The minarets in the Holy cities' of Mecca and Medina follow much in the same manner. However, some of the Mosques in other Islamic countries have adopted interesting forms for minarets, some of which have been depicted below: (Illustrations below from Hattstein: 2001).



Fig. 27. The great Mosque of Djenne, Mali, 1906.

Whilst the Mosque in Mali has been traditionally characterized by local materials, and takes on a unique form with exposed structural elements, the Mosque in Islamabad takes on needle-like minarets, derived from the use of modern materials.



(Fig. 28. Minaret sudies). King Faizal Mosque, Islamabad, Pakistan, 1986.

As previously mentioned in Section A, domes have an important link to Islamic architecture. Locally, their application is used very commonly as is depicted below:





Adjacent:
(Fig.'s 29-30. Mosque analysis).
Dome placed at centre the of the Dar-as-Salaam Mosque, to portray an Islamic eminence.



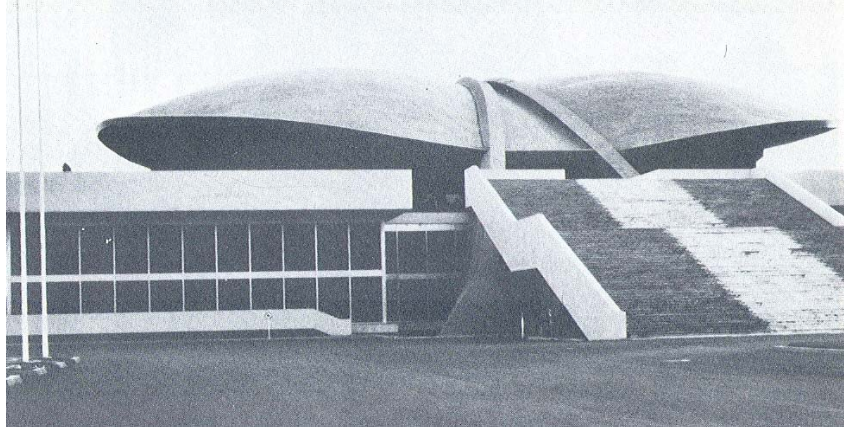
(Fig. 31. Study of domes). Saint Gothard Friday Mosque, Johannesburg.



(Fig. 32. Study of domes). Friday Mosque, Brits

Whilst the adjacent Mosques have domes, these domes are however not centrally located above the centre of the Mosque like the Laudium Mosque.

These much smaller domes have been rather allocated along the approaching façade along the southern end, in order to portray in Islamic aura along the street façade.



Adjacent:
(Fig. 33. Study of domes). Parliament building, Jakarta, Indonesia. (Picture from Lari: 1980).

The dome has taken on a new shape and form, being held by concrete beams that wrap around the dome, which appears to be floating.

The variety of classical elements in varying forms leaves one with inspiration and hope of finding new localized meanings of traditional elements. The elements of a revived Islamic spirit continue to evolve with the passing of time, linking them to the past, and yet venturing forth for more refined interpretations.

2. Case Study: Principles from the Great Mosque at Mecca

From the very onset of Islam, the focus is towards the Ka'ba, The Holy House at Mecca. The Ka'ba together with its surrounding sanctuary, called the *Harem*, is characterized by arched colonnades which appear on each of the three surrounding levels. The rows for prayer around the Ka'ba are circular, whilst the Ka'ba itself is cubic in form. The overall shape of the *Harem* has been modified through the passage of time, but could be described as fairly linear, whilst the inner sanctuary of the Harem surrounding the Ka'ba area, is a square with its corners cut-off.



Fig. 34. The Ka'ba, Great Mosque at Mecca, 1998. (From Hattstein: 2001, p.13).

The overall tendency is the use of pure shapes, which are then in certain instances, cut away to accommodate functional requirements; repetition, rhythm and symmetry are key components. These themes have an everlasting link to Islam, and can also be viewed in the prayer mats produced by the Islamic world, as depicted alongside:



(Fig. 35. Pattern analysis). Southern Siberia, 5th century, Parzyryk carpet. (From Hattstein: 2001, p.531).



(Fig. 36. Pattern analysis). Morocco, late 17th century, Prayer mat. (Picture from Hattstein: 2001, p.323).



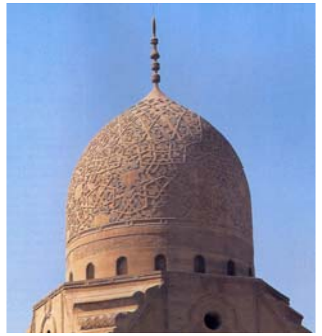
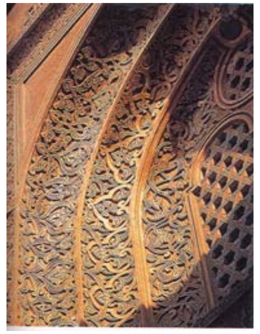
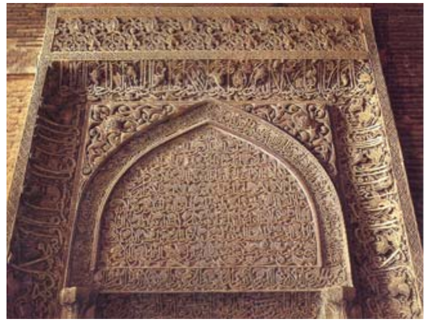
(Fig. 37. Pattern analysis). North western Persia, 18th century, Garden mat. (Picture from Hattstein: 2001, p.491).



(Fig. 38. Pattern analysis). Cairo, Mehraz apartment, Wood cabinet detail, 1971. (From Richards: 1985, p.75).

The prayer mats illustrate rhythm, regular shapes derived from pure geometrical forms, as well as repetition. The use of contrasting colours is used to portray varying geometries. The spinning motif behind the geometric designs can also be observed, whilst the wood cabinet illustrates this concept more boldly. It seems as if these principles are derived from the *Harem*, which has similar themes characterizing it.

The external walls of the Harem are purely decorative walls clad in different patterns of marble and mosaic arrangement, punctuated by necessary openings for access towards the inner sanctuary. This theme of decorative walls, and typically a 'wall-architecture' can be observed in many examples of the Islamic world, as depicted below:

(Fig.'s 39-41. Façade decoration). Mausoleum of Sultan Qaitbay, 1474. (From Hattstein: 2001, p. 191). Illustrations highlights the use of arabesque as a decorative feature to the external wall

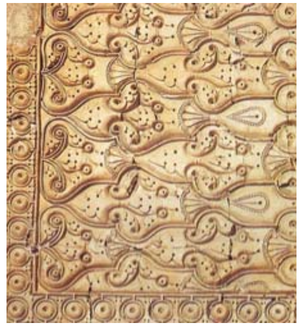




Fig.'s 42-44. House Samarra: Wall decoration, Abbasid reign, 892. (from Hattstein: 2001, pg's 106-107)

The Harem thus excludes the external world, and is inward looking, thereby celebrating the internal world. The focus of the internal world terminates into an open courtyard with the Ka'ba at its centre. From this stems the focus of the internal world in the Islamic world. Depicted below are some examples of an internalized architecture, with the emphasis on the lighting techniques adopted:

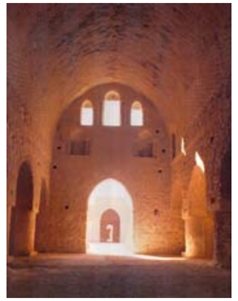


Fig. 45. Lighting



Fig. 46. Lighting

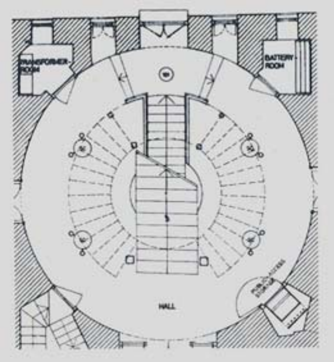
Fig. 45: Qasr al-Banat. Al-Rafika, 12th century. (From Hattstein: 2001, p.100).
Fig. 46: Wakil Bazaar, Kerman, Iran, late 18th century. (From Hattstein: 2001, p.326).

(Below: Fig. 47. Lighting). Dar-as-Salaam centre, Laudium, internal perspective shot at midday.



Interesting to note is that ATA Architects, in their Dar-as-Salaam Mosque, chose heavy walls, and small or recessed glazed openings, which thereby made the interior space dimly lit, even at midday. They state that it is this type of lighting which is soothing to the eye and mind, and ideal for contemplative and meditative purposes, instead of bright daylight filtering through the prayer space.

3. Case Study: The Museum of Ceramics and Glass; Tehran, Iran

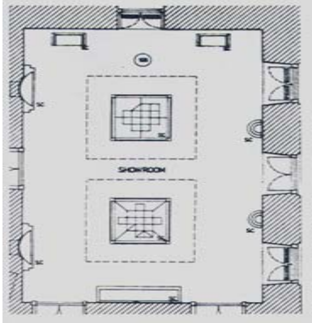


(Fig. 48. Museum study). Simple, symmetrical circular route within a rigid cube (Picture from Lari: 1990, p.).



(Fig. 49. Museum study). Simplicity of route and approach confined within a circle. (Picture from Lari: 1990, p.).

(Below: Fig.'s 50-51. Museum study).

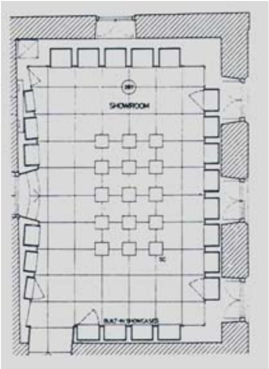


Square plan, gives rise to cubical space. (Picture from Lari: 1990, p.).



Display units take on shape of a reduced proportion of plan. (Picture from Lari: 1990, p.)

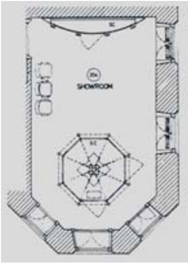
(Below: Fig.'s 52-57. Museum study).



Rectangular plan, with display units cantered. (Picture from Lari: 1990, p.).



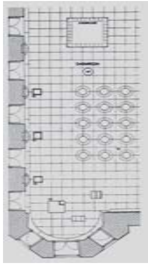
The theme of a grid on the floor plan is taken through into the interior wall façade, wherein the display units also form part of the grid, both in their physical form, and in their individual location. (Picture from Lari: 1990, p.).



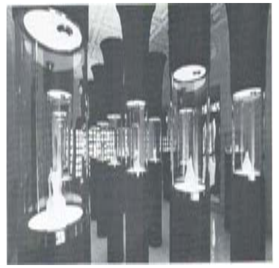
(Picture from Lari: 1990, p.).



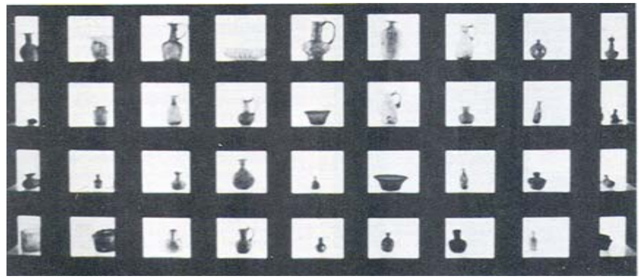
(Picture from Lari: 1990, p.).



(Picture from Lari: 1990, p.).



(Picture from Lari: 1990, p.).



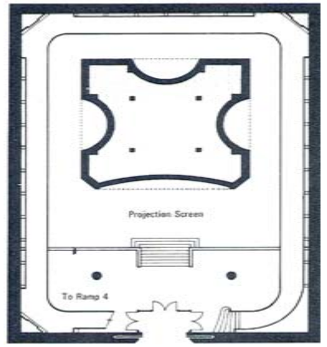
(Fig. 58. Museum study).
Internal wall façade segmented into a rigid grid for the display of individual exhibits. (Picture from Lari: 1990, p.).

Simplicity, symmetry and rigid geometric implementation become the theme of the exhibition. Circles, squares and rectangles play an important role in the general arrangement, developing from the plan, and terminating in the arrangement of the individual displays within the exhibition.

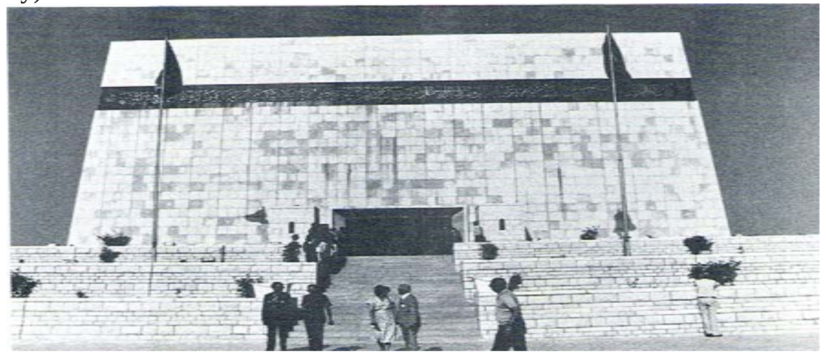
The theme seems to have developed from the circulation of the Ka'ba: the Ka'ba being the celebrated cube, whilst the pathway around it is fixed within the confines of a rigid route. The route initiates within the confines of a circle, similar to the circumambulation of the Ka'ba, and later changes the circulation within the confines of squares and rectangles, amidst cubic display units.

4. Case Study: The Martyrs Memorial, Amman, Jordan

This is a monument to the members of Jordan's Armed Forces, who had lost their lives in the service of their country. The building is made of reinforced concrete faced with white stone. The height of the museum allows hot air to rise, whilst the white marble reflects heat. Encircled near the top is a basalt band of *Qur'anic* inscriptions. The internal space is merely a cube. Along the sides are ascending ramps devoted to a procession through periods of military history. The ramps support display cases. At the very top, the journey terminates into a garden, symbolizing the garden of paradise in which lie the brave warriors.
(Below: Fig.'s 59-60. Museum study).



(Picture from Lari: 1990, p.)



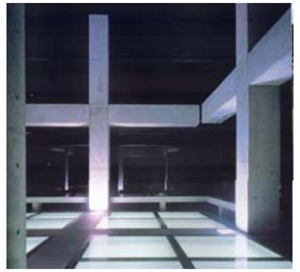
Kuwait Museum. (Picture from Lari: 1990, p.)

Characteristic of this monument, as well as the Museum of Glass and Ceramics, are the strict geometry and rigid routes which have been implemented. Both exploit the use of the cubic form to generate the plan as well as the internal spaces.

5. Case study: Museums, Galleries and Churches by Tadao Ando

- **Abstract elements and geometry:**

Tadao Ando's play with abstract elements in their purest forms avoids the figurative display of images. Simple gestures are made, using the principles of mass, volume, scale and proportion to stimulate powerful meanings.






Church on the water, Hokkaido, 1988 | Church on the water, Hokkaido, 1988 | Church of the Light, Osaka, 1989.

(Above: Fig.'s 61-64. Museum study. From Jodidio: 2001, pg.'s 79-85).

He emphasizes these abstract elements by placing them within a definite geometric grid across floor and roof plans, and across internal and external facades. The result is a suggestive blend of materials, symbols, geometry and architecture holistically working together to suggest strong character and meaning.

- **Floating masses within pure geometry:**



Koshino project, Ashiya, 1984. (from Jodidio: 2001)

(Adjacent: Fig. 65. Museum study). Concrete appears to be supported by a large span of glass. The contrast between heaviness and lightness are juxtaposed to create tension and a feeling of one element floating over another.

The example below illustrates the using of a concrete cylinder, and creating a floating experience internally via a circular concrete slab hovering above.

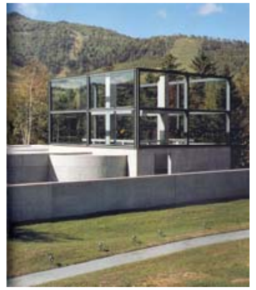




Meditation space, UNESCO, Paris, France, 1995.
(Fig.'s 66-68. Museum study. From Jodidio: 2001, pg.'s 160-163).

- **Celebration of geometric form and the internal world:**





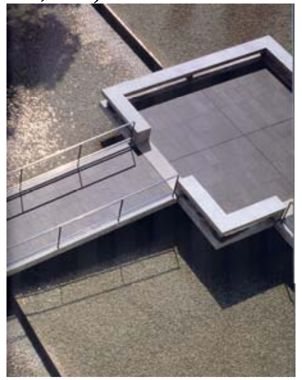

(Above: Fig.'s 69-72. Museum study). Literature Museum, Himeji, 1996. (From Jodidio: 2001, pg.'s 104-107).
(Below: Fig.'s73-75. Museum study. From Jodidio: 2001, pg.'s 116, 102, 122).



Water Temple, Hyogo, 1989.



Forest of Tombs Museum, Kumamoto, 1992



Literature Museum, Himeji, 1996.



(Fig. 76. Museum study).
Church of the Light, Osaka, 1989.
(Form Jodidio: 2001, p. 86)



(Fig. 77. Museum study). Church of the Light, Osaka, 1989.
(From Jodidio: 2001, p. 87).

Form and shape originate from an underlying geometry. The external facades are characterized by heavy walls within regular geometric forms, housing concrete panels. The external façade has few openings, and the internal world is celebrated via majority of the light stemming from the roof or via the courtyard space.

- **Structural elements:**


(Fig 78. Museum study). Rocco project, Kobe, 1989.


(Fig. 79). Child Museum, Himeji, 1989.


(Fig. 80). Lit. Museum, Himeji, 1996.


(Fig. 90. Museum study). Awaji Island project, Hyogo, 2000.

(Illustrations from Jodidio: 2001, pg.'s 62-63, 91, 101, 165).



(Fig's 91-92. Museum study). Narawiya Museum, Okayama, 1994. (From Jodidio: 2001, p. 135).

Comments: The architecture is celebrated by protruding structural elements beyond the confines of the building proper.
Adjacent: A vertical wall placed between two flights of stairs, terminating horizontally between their landings, creates a strong separation between the two. A new character is given to the vertical ascension / descension of space. The stairs at their uppermost end terminate at an almost floating landing characterized by light railings and a single column for support.

- **The internal world:** (Below: Fig.'s 93-95. Museum study).


Art Museum, Kagawa, 1995.


Vitra project, Germany, 1993.


Historical Museum, Osaka, 1994.

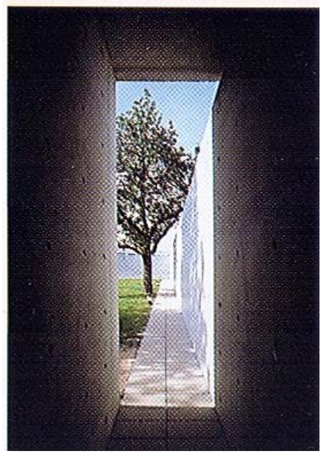
(Above illustrations from Jodidio: 2001, pg.'s 97, 107, 129).

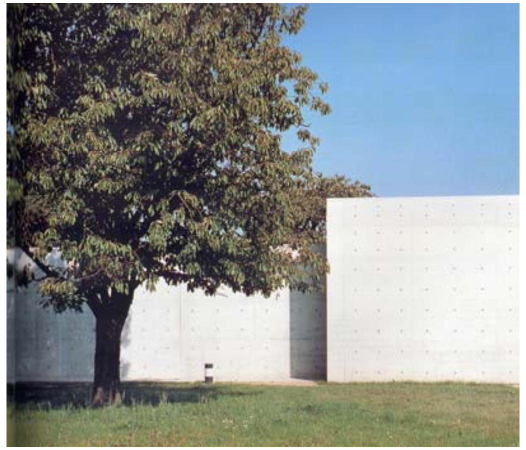

Koshino project, Ashiya, 1984.
(From Jodidio: 2001, p.69)

The internal world is characterised by light-weight elements in contrast to the heaviness of the exterior concrete walls. The internal world is painted white, with timber flooring. Verticality is punctuated by light-weight ramps or bridges, with slender, almost transparent balustrade components.

(Adjacent: Fig. 96. Museum study). The play of lighting has been determined from the inside out. This can clearly be observed upon analyzing the strip-lighting puncturing through a heavy concrete wall, thereby celebrating the emphasis of an 'internalized' architecture.

- **Surroundings and Approach:**





(Above: Fig.'s 97-98. Museum study). Vitra project, Germany, 1993. (From Jodidio: 2001, p.108-109).



Koshino project, Ashiya, 1984. (from Jodidio: 2001, p.66).

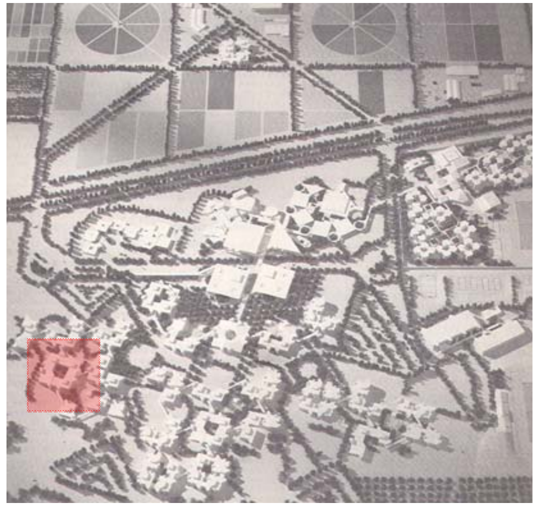
Above: Upon leaving or entering the building, one encounters a small passageway, which is almost hidden via an overlapping external world.

(Adjacent: Fig. 99. Museum study). There exists a strong contrast between the greyness of the concrete to the surrounding greenery which complements each other in a striking manner.

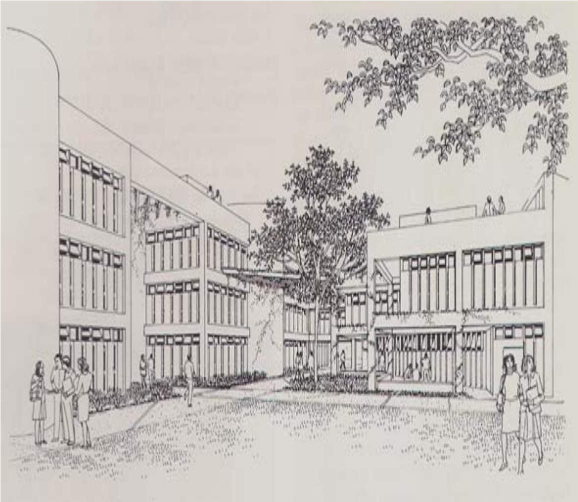
6. Case Study: Aga Khan Awards

The theme of repetition within geometry is observed to be a typical Islamic trait for both architectural and art forms. This repetitive geometry is then further highlighted, at times within a spinning motif, or within a regular geometric grid, thereby establishing a hierarchy of structures. Internal environments are typically characterized by leading out into a courtyard or semi-courtyard. 'Wall-architecture' further lends support to this theory, since their massing within the harsher environments is advantageous in ensuring protection and better internal thermal environments. Where external environments need to be excluded, yet ventilation is required, a breeze wall is placed. Glazing is usually recessed, or appears as a small fraction of the wall-to-floor ratio. The internal world is celebrated, with the external world either being completely or semi-permeably shut out, and structures are within the shade of neighbouring structures. The examples below are set out to methodically illustrate these concepts:

Illustrated below is an example of a university layout in Algeria. The plan is based upon a rigid geometry, and the courtyard spaces thereby generated, are typical of an inward Islamic layout. Sustainable practices, such as, passive ventilation, recessed glazed facades, the use of locally produced low intensity concrete blocks and the emphasis on preserving and adopting local fauna and fauna, were adopted.



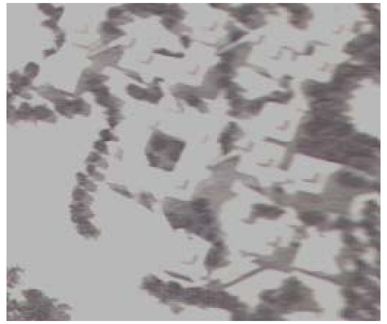
(Fig. 100. General study). University of Blida, Algeria. Aerial view. (Picture from Lari: 1990, p.32).



(Fig. 101. General study). University of Blida, Algeria. Cluster courtyard (Picture from Lari: 1990, p.32).

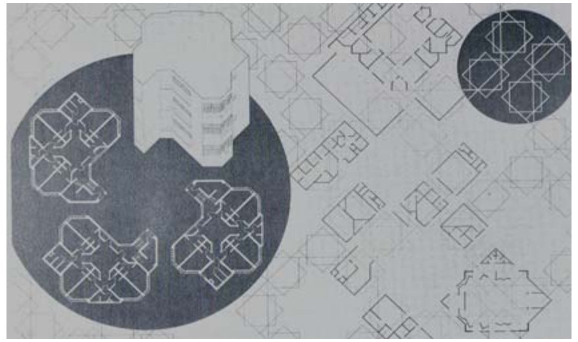
Demarcated alongside in red, is the spinning motif of an individual structure of the university. This spinning motif of the plan in the form of a square accommodates the adjacent structures to align themselves to it, and thereby creates a system of parallel axes within a definite grid. This theme of a spinning motif within the overall geometry can be observed in many contemporary Islamic complexes. In the case of this university, the majority of the structures are similarly based, providing an internal courtyard for every structure, and thereby creating a distinct rhythm, repetition and character of the overall form.

The general idea is to create an architecture wherein each component becomes part of a whole, or wherein the geometry of each component is a variation of the underlying geometry of the whole.



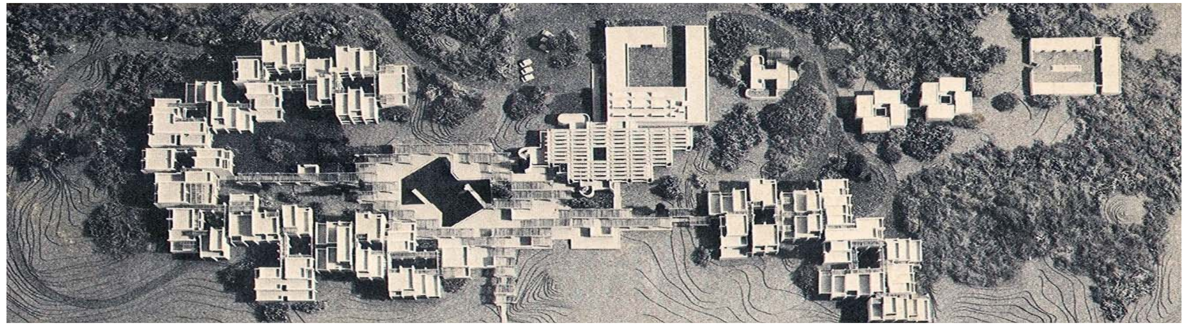
(Fig. 102. General study). Enlarged aerial view, (demarcated in red alongside), of a component of the University of Blida, Algeria. (Picture from Lari: 1990, p.32).

Illustrated alongside, geometric patterns have been extensively used within the confines of the general landscape, resulting in a variety of building shapes and sizes which relate to the overall geometry of the university. The plan has an underlying spinning motif, whilst the form is a resultant of internal functionality within the confines of a strict geometrical order.

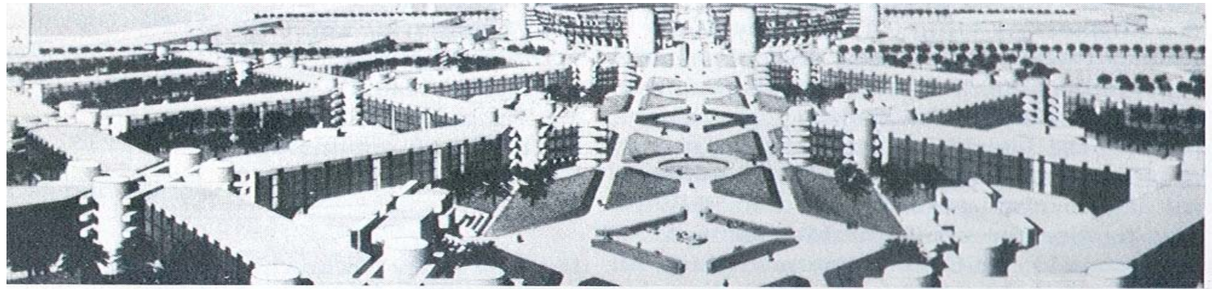


(Fig. 103. General study). University of Blida, Algeria, Housing Component. (Picture from Lari: 1990, p.37).

Similar principals can be observed from other examples within different contexts, as illustrated on the following page:

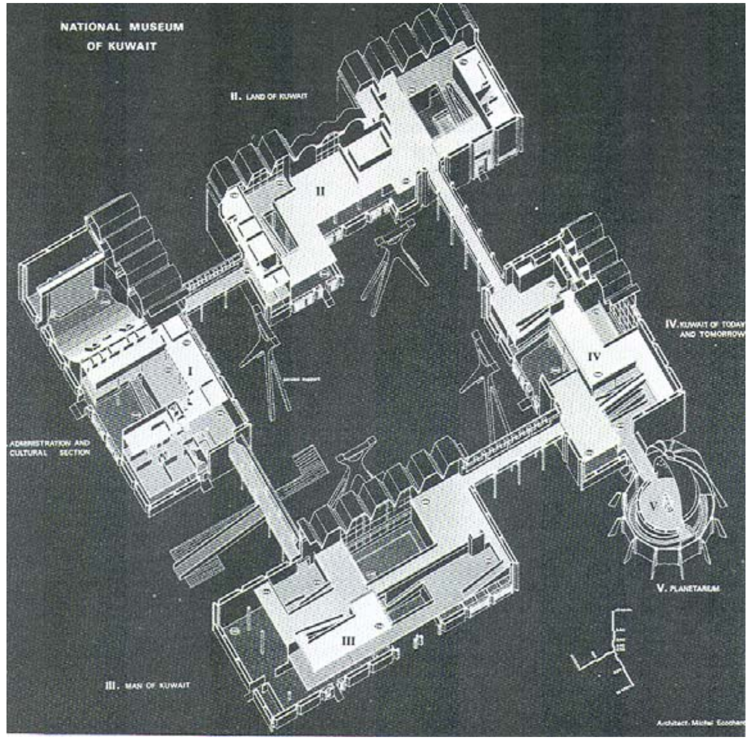


(Fig. 104. General study). Holiday Village, M'diq, Morocco. (Picture from Lari: 1990, p.1).



(Fig. 105. General study). Yarmouk University, Jordan. (Picture from Lari: 1990, p.41).

The National Museum of Kuwait, as illustrated below, essentially comprises of five separate buildings around a centrally inward looking garden. The buildings are linked to each other by longitudinal ramps which serve the dual function of being galleries whilst commuting viewers from one region to another.



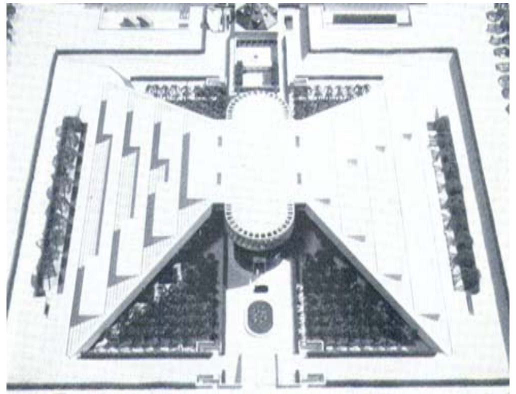
The National Museum of Kuwait. (From Lari: 1990, p.100).

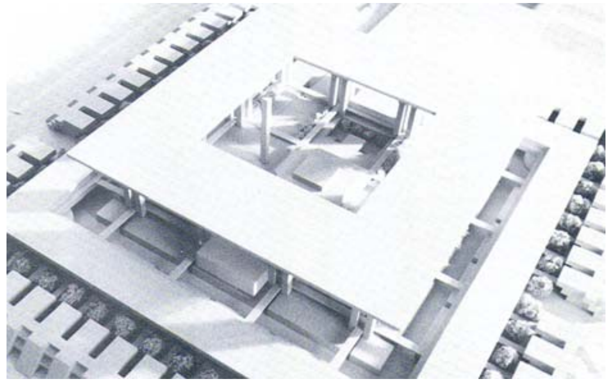
This example once again denotes the use of the spinning motif, within a rigid geometry. The result of the spinning motif was the creation of an internal courtyard, which has climatic advantages, and is strongly linked to tradition and Islamic architecture.
(Adjacent: Fig. 106. General study).

The following examples further illustrate the spinning motif and the application of rigid geometry, such as the cube, which has been cut-away, resulting in a 'wall-architecture' with internalized courtyards.



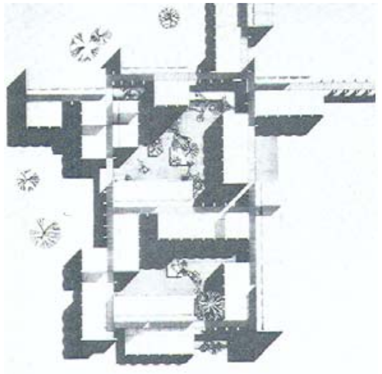
(Fig. 107.). Government administrative centre, Riyadh, Saudi Arabia. (Picture from Lari: 1990, p.90).





(Fig.'s 108-109. General study). Air Defence Headquarters, Riyadh, Saudi Arabia. (From Lari: 1990, p. 92).

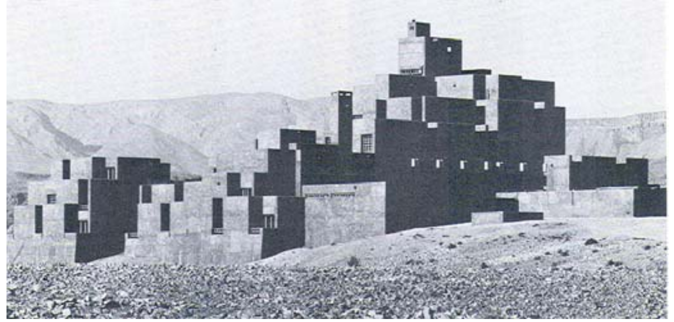
'Wall-architecture' can be seen in the following illustrations below, wherein massive walls are celebrated with small window openings, thereby placing emphasis on the internal world. The grouping of structures can also be observed from the plan, with open spaces in between, so as to take advantage of shadows in a harsh climate.



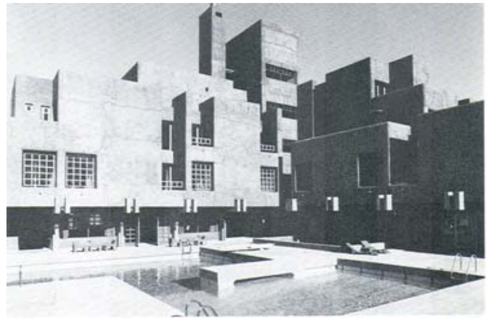
(Fig. 110. Global study). Casbah at Taliouine, Morocco. (Picture from Lari: 1990, p.74).



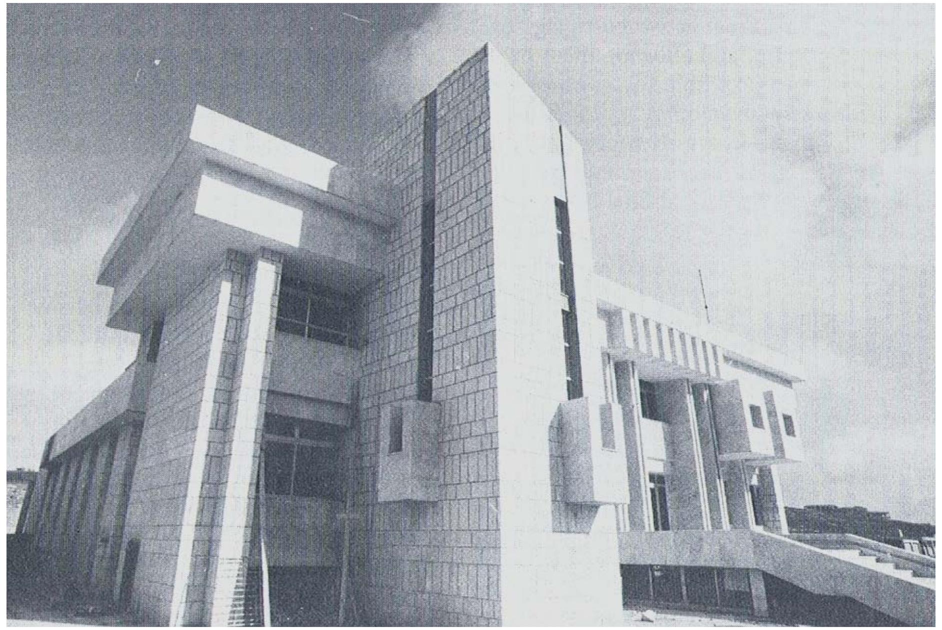
(Fig. 111. Global study). Casbah at Taliouine, Morocco. (Picture from Lari: 1990, p.72).



(Fig. 112. Global study). Hotel at Dadus, Morocco. (Picture from Lari: 1990, p.70)



(Fig. 113. Global study). Hotel at Dadus, Morocco. (Picture from Lari: 1990, p.70)



(Fig. 114. Global study). Press and publication building, Amman, Jordan (Picture from Lari: 1990, p.143).

The above illustration indicates a new spirit to Islamic architecture in Jordan. It is climatically suitable, with its huge mass walling and recessed glazing. The design has been informed by a cubical geometric form, with cut-outs, protrusions and recesses in the cube to cater for functional, climatic and aesthetic needs.